National Institute of Environmental Health Sciences

Implications of differences between temperate and tropical freshwater ecosystems for the ecological risk assessment of pesticides

Author(s): Daam MA, Van den Brink PJ
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Abstract:

Despite considerable increased pesticide use over the past decades, little research has been done into their fate and effects in surface waters in tropical regions. In the present review, possible differences in response between temperate and tropical freshwaters to pesticide stress are discussed. Three underlying mechanisms for these differences are distinguished: (1) climate related parameters, (2) ecosystem sensitivity, and (3) agricultural practices. Pesticide dissipation rates and vulnerability of freshwaters appear not to be consistently higher or lower in tropical regions compared to their temperate counterparts. However, differences in fate and effects may occur for individual pesticides and taxa. Furthermore, intensive agricultural practices in tropical countries lead to a higher input of pesticides and spread of contamination over watersheds. Field studies in tropical farms on pesticide fate in the enclosed and surrounding waterways are recommended, which should ultimately lead to the development of surface water scenarios for tropical countries like developed by the Forum for the co-ordination of pesticide fate models and their use for temperate regions. Future tropical effect assessment studies should evaluate whether specific tropical taxa, not represented by the current standard test species in use, are at risk. If so, tropical model ecosystem studies evaluating pesticide concentration ranges need to be conducted to validate whether selected surrogate indigenous test species are representative for local tropical freshwater ecosystems.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Food/Water Quality

Food/Water Quality: Chemical

Geographic Feature:

resource focuses on specific type of geography

Freshwater, Tropical, Other Geographical Feature

Other Geographical Feature : Temperate

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Review

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content